

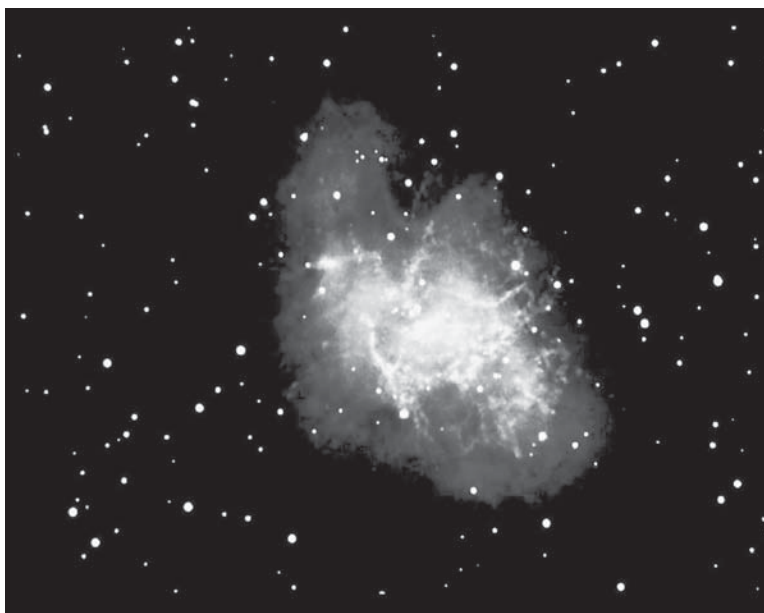
Life Cycles of Stars—Part 1

Stars have life cycles, just like humans. In fact, a star is born, changes, and then dies. In contrast to the human life cycle that lasts about 75 years, the life cycle of a typical star is measured in billions of years.

Every star in the sky is at a different stage in its life cycle. Some stars are relatively young, while others are near the end of their existence. The sun is about halfway through its 10-billion-year-long life cycle.

Birth of a Star

The space between stars is not entirely empty. In some places, there are great clouds of gas and dust. Each of these clouds is a nebula. A nebula is where stars are born.



The element hydrogen makes up most of a nebula. Helium and a sprinkling of dust are also present. The particles in a nebula are spread very thin. In fact, the particles are a million times less dense than the particles in the air you breathe. However, since nebulae are very large, they contain enormous amounts of matter.

Gravity causes matter to be attracted to other matter. Therefore, as a nebula travels through space, it collects more dust and gas. The clouds become packed tighter and tighter, as gravity pulls it all together. Whenever matter is packed in this way, it heats up. An especially dense part of the nebula may form a hot, spinning ball of matter. Such a ball of hot matter is called a protostar.

A protostar doesn't yet shine by ordinary light, but it does give off infrared energy. Scientists identify protostars within nebulae using infrared telescopes. A protostar eventually becomes hot enough for nuclear fusion to take place in its core. When nuclear fusion produces great amounts of energy, a star comes to life.

Low-Mass Star

Stars begin their life cycle with different masses. A star's mass determines how long its life cycle will last and how it will die. Stars with a mass less than five times that of the sun are called low-mass stars. Most stars are in this group.

A low-mass star begins its life cycle as a main-sequence star. Over a period of billions of years, its supply of hydrogen is slowly changed by nuclear fusion into helium. During this time, the star changes very little.

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